

CLAIMS

What is claimed:

1. A system comprising:

a dispense head having a passageway therethrough, an inlet opening, at least one outlet opening, and a drain opening, the passageway interconnecting the inlet opening, the at least one outlet opening, and the drain opening;

a first valve connected to the inlet opening; and

a second valve connected to the drain opening, a fluid flowing into the inlet opening, through the passageway, and out of the at least one outlet opening when the first valve is open and the second valve is closed, the fluid flowing from the passageway out of the drain opening when the first valve is closed and the second valve is open.

2. The system of claim 1, wherein the passageway has a bottom, the inlet opening is a first height above the bottom of the passageway, the at least one outlet opening is a second height above the passageway, the second height being less than the first height, and the drain opening is a third height above the bottom of the passageway, the third height being less than the second height.

3. The system of claim 2, wherein no fluid flows from the passageway out of the outlet opening when the first valve is closed and the second valve is open.

4. The system of claim 3, wherein the drain opening has a diameter of at least 0.10 inch.
5. The system of claim 4, wherein the drain opening is adjacent to the bottom of the passageway.
6. The system of claim 5, further comprising a pump having a low pressure side and a high pressure side, the low pressure side being connected to the second valve.
7. The system of claim 6, further comprising:
 - a frame; and
 - a substrate support attached to the frame to support a semiconductor substrate, the dispense head being connected to the frame and suspended in a selected position relative to the substrate.
8. The system of claim 7, wherein when the first valve is open and the second valve is closed, the fluid flows into the inlet opening, through the passageway, out of the at least one outlet opening, and onto the semiconductor substrate.

9. The system of claim 8, wherein the fluid is a semiconductor processing liquid.
10. The system of claim 9, wherein the dispenser head is moveable relative to the substrate support.
11. A system comprising:
- a dispense head having a passageway therethrough, an inlet opening, at least one outlet opening, and a drain opening, the passageway interconnecting the inlet opening, the at least one outlet opening, and the drain opening;
 - a first valve connected to the inlet opening;
 - a second valve connected to the drain opening; and
 - a pump having a low pressure side and a high pressure side, the low pressure side being connected to the second valve, a fluid flowing into the inlet opening, through the passageway, and out of the at least one outlet opening when the first valve is open and the second valve is closed, the fluid flowing from the passageway out of the drain opening when the first valve is closed and the second valve is open.
12. The system of claim 11, wherein no fluid flows from the passageway out of the outlet opening when the first valve is closed and the second valve is open.

13. The system of claim 12, wherein the drain opening is adjacent to the bottom of the passageway.
14. The system of claim 13, further comprising:
a frame; and
a substrate support attached to the frame to support a semiconductor substrate, the dispense head being connected to the frame and suspended in a selected position relative to the substrate.
15. The system of claim 14, wherein when the first valve is open and the second valve is closed, the fluid flows into the inlet opening, through the passageway, out of the at least one outlet opening, and onto the semiconductor substrate.
16. A semiconductor substrate processing apparatus comprising:
a frame;
a substrate support attached to the frame to support a semiconductor substrate;
a dispenser head moveably connected to the frame and suspended in a selected position relative to the semiconductor substrate, the dispenser head having a bottom piece, an inlet opening a first height above the bottom piece, at least one outlet opening a second height above the bottom piece, the second

height being less than the first height, a drain opening a third height above the bottom piece, the third height being less than the second height, and a passageway therethrough interconnecting the inlet opening, the at least one outlet opening, and the drain opening;

a first valve connected to the inlet opening; and

a second valve connected to the drain opening, a fluid flowing into the inlet opening, through the passageway, and out of the outlet opening when the first valve is open and the second valve is closed, the fluid flowing from the passageway out of the drain opening when the first valve is closed and the second valve is open.

17. The semiconductor substrate processing apparatus of claim 16, wherein when the first valve is open and the second valve is closed, the fluid flows into the inlet opening, through the passageway, out of the at least one outlet opening, and onto the semiconductor substrate.

18. The semiconductor substrate processing apparatus of claim 17, wherein no fluid flows from the passageway out of the outlet opening when the first valve is closed and the second valve is open.

19. The semiconductor substrate processing apparatus of claim 18, wherein the dispenser head is suspended over the semiconductor substrate.

20. The semiconductor substrate processing apparatus of claim 19, wherein the drain opening has a diameter of at least 0.10 inches.

21. A semiconductor substrate processing apparatus comprising:

a frame;

a substrate support attached to the frame to support a semiconductor substrate;

a dispenser head connected to the frame and suspended over the semiconductor substrate, the dispenser head having a bottom piece, an inlet opening a first height above the bottom piece, a plurality of outlet openings a second height above the bottom piece, the second height being less than the first height, a plurality of nozzles, each being connected to a respective outlet opening, a drain opening a third height above the bottom piece, the third height being less than the second height, and a passageway therethrough interconnecting the inlet opening, the plurality of outlet openings, and the drain opening;

a first valve connected to the inlet opening;

a second valve connected to the drain opening; and

a pump having a low pressure side and a high pressure side, the low pressure side being connected to the second valve, a fluid flowing into the inlet opening, through the passageway and the plurality of outlet openings, out of the

plurality of nozzles and onto the semiconductor wafer when the first valve is open and the second valve is closed, the fluid from the passageway out of the drain opening and no fluid flowing from the passageway out of the plurality of nozzles when the first valve is closed and the second valve is open.

22. A method comprising:

connecting an opened first valve to a first opening on a dispense head;

connecting a closed second valve to a second opening on the dispense head, a fluid flowing into a passageway of the dispense head through the first opening and out of the dispense head through a third opening; and

closing the first valve and opening the second valve to drain the fluid from the dispense head through the second opening.

23. The method of claim 22, wherein the passageway has a bottom, the inlet opening is a first height above the bottom of the passageway, the at least one outlet opening is a second height above the passageway, the second height being less than the first height, and the drain opening is a third height above the bottom of the passageway, the third height being less than the second height.

24. The method of claim 22, further comprising connecting a low pressure side of a pump to the second valve, the fluid flowing from the dispense head

through the second valve and into the pump when the first valve is closed and the second valve is open.